

# PATENT ABSTRACTS OF JAPAN

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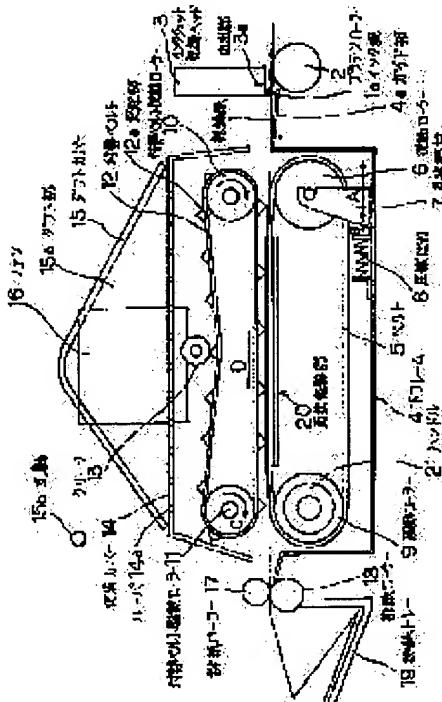
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## (54) INK JET RECORDING APPARATUS

### (57)Abstract:

**PURPOSE:** To fix an ink within a short time without lowering image quality.

**CONSTITUTION:** A feed belt 5 for feeding recording paper 1 immediately after ink is emitted from an ink jet recording head 3 in predetermined emitting timing to form an ink image, a drive roller 9 driving the belt 5 in synchronous relation to the emitting timing, the planar heating part 20 heating the belt and a plurality of projections 12a for bringing the recording paper 1 into contact with the belt 5 under pressure over the almost whole width of the max. recording width thereof are provided. Further, an energizing belt 12 is provided under tension so as to be movable in contact with the recording paper with the movement of the belt 5.



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CLAIMS

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[Claim(s)]

[Claim 1] The ink-jet recording device which is characterized by providing the following and which breathes out ink from an ink-jet recording head to predetermined regurgitation timing, and forms a picture in a recorded member. The conveyance belt for conveying the recorded member immediately after forming a picture. The conveyance mechanical component which drives this conveyance belt synchronizing with the aforementioned regurgitation timing. An exoergic means to heat the aforementioned conveyance belt. The energization belt stretched possible [ movement ] while two or more heights for carrying out the pressure welding of the aforementioned recorded member to the aforementioned conveyance belt covering the abbreviation full of the maximum recording width were prepared and the aforementioned recorded member was contacted with movement of the aforementioned conveyance belt.

[Claim 2] The ink-jet recording device according to claim 1 characterized by having the cleaner which becomes the height of an energization belt from the member which has been arranged possible [ contact ], and which has absorptivity.

[Claim 3] The claim 1 characterized by having the energization belt driving section to which an energization belt is moved synchronizing with movement of a conveyance belt, or an ink-jet recording device given in two.

[Claim 4] An exoergic means is the claims 1 and 2 characterized by being the field-like exoergic section which carries out field contact at the range of the conveyance belt with which the pressure welding of the recorded member is carried out by the height of an energization belt at least, or an ink-jet recording device given in three.

[Claim 5] The claims 1, 2, and 3 characterized by forming the height of an energization belt by the resin which has thermal resistance, or an ink-jet recording device given in four.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the ink-jet recording device equipped with the mechanism established in the picture which was made to breathe out ink from an ink-jet recording head, and was formed in the recorded member.

[0002]

[Description of the Prior Art] Conventionally, the thing that this kind of ink fuser performs dryness fixing of ink giving the heat ray of a direct infrared field as radiant heat to the ink in the record paper and by applying hot blast to the ink in the record paper has been proposed.

[0003]

[Problem(s) to be Solved by the Invention] However, there are the following troubles in the Prior art mentioned above.

(1) Since the wavelength field where ink carries out the water absorption of the water to the cellulose which is the principal component of paper when it is by remarkable \*\*\*\*\* is almost the same, The problem that the portion in which the ink of the recording paper has not appeared will carry out yellow discoloration if radiant heat is radiated so much when drying ink for a short time arises, or Moreover, if hot blast is given to the recording paper so much in order to dry ink for a short time, the ink drop in the record paper will flow and a picture will be destroyed.

(2) The rate absorbed among the heat energy generated from the heat source by the recording paper and the ink drop in the record paper will be low, and power consumption will become large.

(3) To the ink drop on the Records Department-ed material, if it does not heat uniformly, the concentration of a picture will not become uniform but will cause picture degradation, such as concentration nonuniformity.

[0004] this invention became in view of the trouble which the above-mentioned Prior art has, and it aims at offering the ink-jet recording device equipped with the ink fuser which can be established in ink in a short time, without reducing quality of image.

[0005]

[Means for Solving the Problem] In the ink-jet recording device which this invention breathes out ink from an ink-jet recording head to predetermined regurgitation timing, and forms a picture in a recorded member The conveyance belt for conveying the recorded member immediately after forming a picture, The conveyance mechanical component which drives this conveyance belt synchronizing with the aforementioned regurgitation timing, An exoergic means to heat the aforementioned conveyance belt, and two or more heights for carrying out the pressure welding of the aforementioned recorded member to the aforementioned conveyance belt covering the abbreviation full of the maximum recording width are prepared. It has the energization belt stretched possible [ movement ], contacting the aforementioned recorded member with movement of the aforementioned conveyance belt.

[0006] Moreover, the thing equipped with the cleaner which consists of a member which has absorptivity arranged possible contact ] in the above-mentioned ink-jet recording device at the height of an energization belt, What has the energization belt driving section to which an energization belt is moved synchronizing with movement of a conveyance belt, and an exoergic means At least, what is the field-like exoergic section which carries out field contact, and the thing in which the height of an energization belt is formed by the resin which has thermal resistance are in the range of the conveyance belt with which the pressure welding of the recorded member is carried out by the height of an energization belt.

[0007]

[Function] According to the ink-jet recording device of this invention, to the conveyance belt heated by the exoergic means Since it has the energization belt with which two or more heights which carry out the pressure welding of the recorded member immediately after forming a picture covering the abbreviation full of the maximum recording width were prepared At least, the aforementioned conveyance belt will be contacted, the heat of this conveyance belt is transmitted to the aforementioned recorded member, and ink carries out dryness fixing of the portion in which the picture of the aforementioned Records Department-ed material was formed.

[0008]

[Example] Next, the example of this invention is explained with reference to a drawing.

[0009] Drawing 1 is the side elevation showing one example of the ink-jet recording device of this invention.

[0010] the ink in which this example was supplied from the ink supply pipe (un-illustrating) -- the record-ed from regurgitation section 3a of the ink-jet recording head 3 -- by carrying out the regurgitation to the recording paper 1 which is a member, it is the ink-jet recording device which forms a picture, and has the ink fuser for making the recording paper 1 carry out dryness fixing of the aforementioned ink

[0011] The timing to which the ink-jet recording head 3 of the aforementioned ink-jet recording device carries out the regurgitation of the ink is constituted so that it may be carried out synchronizing with the rotation of a platen roller 2 which conveys the recording paper 1.

[0012] The state of an ink drop immediately after being breathed out by the recording paper 1 in drawing 1 is expanded and expressed, and it is referred to as 1a. The recording paper 1 with which the picture was formed of the ink-jet recording head 3 is led in the background of an image formation side by guide section 4a formed with a part of lower frame 4 on the belt 5

for recording paper conveyance stretched by the drive roller 9 and the follower roller 6. The energization belt 12 with which two or more height 12a for carrying out the pressure welding of the recording paper 1 to this belt 5 front face was prepared above this belt 5 is stretched by the energization belt driving roller 11 and the energization belt follower roller 10. With these belts 5 and energization belts 12, the pressure welding of the recording paper 1 laid on the aforementioned belt 5 will be carried out to the belt 5 aforementioned front face. Moreover, inside the aforementioned belt 5, the field-like exoergic section 20 which carries out field contact and which is an exoergic means is formed in the up inside.

[0013] The quality of the material which can also fully bear the tensile stress which does not start fatigue breaking even if it is desirable to make the heat with which the aforementioned field-like exoergic section 20 emits a belt 5 here conduct to per unit time as so much from a rear face to a front face as possible and a belt 5 repeats incurvation according to the life of this equipment, corresponding to the curvature of the drive roller 9 and the follower roller 6 further, but is produced with compression spring 9, and thickness are required. In the case of the usual business machine, the durable rotational frequency of a belt 5 is number 1 million rotation from hundreds of thousands rotations. The seamless belt made from nickel processed by the electro foaming method in consideration of the above-mentioned demand function in this example is used. The thickness of a belt 5 is several micrometers. It is desirable to be selected in the range of 100 microns of shell numbers, and it is 50 micrometers at this example. It carried out. Moreover, the time when the radius of the drive roller 9 or the follower roller 6 cannot take greatly according to product specification, the time when the bearer rate of a belt 5 is required for a bearer rate (100mm/s or several 100mm, and several 1000mm), and the belt made from stainless steel which the durable rotational frequency carried out plasma arc welding of millions and the sheet metal made from the stainless steel which carried out rolling hardening tens of millions revolutions when required, processed it into the belt 5, and added like annealing and the roll turner further are sufficient. Hard Vickers hardness Hv of the belt made from stainless steel at this time is hundreds, and about Hv =200-800 is desirable.

[0014] A problem is not produced when the temperature of the field-like exoergic section 20 of degradation of the belt 5 by the field-like exoergic section 20 later mentioned when a belt 5 is formed with a metal like \*\*\*\* is about 600 degrees C or less. It has controlled to become the range whose skin temperature of elevated-temperature \*\*\*\*\* 204 (refer to drawing 2) of the field-like exoergic section 20 is 100 degrees C - 180 degrees C in this example. As mentioned above, since the skin temperature of the field-like exoergic section 20 is 600 degrees C or less, The quality of the material of a belt 5 A polyimide (PI), polyphenylene sulfide (PPS), A polyether ape phon (PES), a polyimidoamide (PIA), Plastics, such as a polyamide (PA) and a polyethylene terephthalate (PET), is formed into a seamless belt by inflation molding etc. By rolling out after that, a mechanical strength may be increased and the aforementioned sheet plastic by which biaxial extension was carried out beforehand may be belt-sized by heat welding. in this case, since the extension process has finished before belt-sizing, a large cost cut should be realized by belt-sizing by heat welding, and if the shape of a straight chain PPS (the shape of urea) developed further recently is used, don't perform an extension process but carry out for obtaining a required mechanical strength and belt-sizing by fabrication -- carry out for belt-sizing by heat welding -- it becomes with a still larger cost cut Also setting, when the belt made from plastics is used, the thickness is several micrometers. 100 micrometers of shell numbers Although a grade is appropriate, it is 10 micrometers of numbers as a result of an experiment. A grade is desirable. Now, as for the drive roller 9, it is desirable for thermal resistance, such as silicone rubber or a fluororubber, to have a front face at least, and to cover the coefficient of friction mu to this belt 5 with the highest possible material or more by 0.1 to the above-mentioned belt 5. Moreover, the aforementioned follower roller 6 is formed by plastics, such as PET with thermal resistance, a polycarbonate (PC), and PPS, or aluminum, the sintered alloy, etc. This follower roller 6 is supported to the lower frame 4 by the supporter material 7 which can move in the direction of B in drawing. This supporter material 7 is always energized in the direction of C in drawing by the compression spring 8 which fixed the end to the bottom frame 4 of the above in order to make the aforementioned belt 5 generate tension. Furthermore, the peripheral speed of a belt 5 is the same as the peripheral speed of the aforementioned platen roller 2, or it is set up so that it may become quicker than it.

[0015] Next, the field-like exoergic section 20 is explained with reference to drawing 2.

[0016] The field-like exoergic section 20 of this example is equipped with elevated-temperature \*\*\*\*\* 204 which has rigidity and consists of material, such as aluminum with high thermal conductivity, and touches the belt 5 by this elevated-temperature \*\*\*\*\* 204. For this elevated-temperature \*\*\*\*\* 204, the flatness of a perpendicular direction is hundreds of micrometers to the conveyance direction of the recording paper 1. Irregularity is managed so that it may become less than. Elevated-temperature \*\*\*\*\* 204 of this example is formed with aluminum, performs alumite processing to the contact surface with the belt 5, and is raising surface hardness to it. Therefore, it is rare to wear elevated-temperature \*\*\*\*\* 204 out by sliding with a belt 5. Furthermore, the insulating material 201 which thermal conductivity becomes from a high material (silicone rubber is used in this example) of isolation voltage highly is stuck on the inferior surface of tongue of elevated-temperature \*\*\*\*\* 204. And four heaters 202a, 202b, 202c, and 202d which consist of self-thermolysis type ceramic heaters carry out field contact, and are installed in the inferior surface of tongue of the aforementioned insulating material 201 side by side. To these four heaters 202a, 202b, 202c, and 202d, thermal fuse 203b in contact with thermal fuse 203a in contact with this heater 202a and heater 202b and heater 202c and heater 202d is prepared.

[0017] Moreover, if the electric resistance value has the same composition and Heaters 202a, 202b, 202c, and 202d impress the same current to these heaters 202a, 202b, 202c, and 202d in this example, the temperature up will be carried out almost similarly. Furthermore, a Heaters [ 202a 202b, 202c, and 202d ] rear-face side has thermal resistance, and is covered with the heat insulator 205 with high electric insulation. Although a heat insulator 205 has [ a low, asbestos, a ceramic, etc. ] desirable thermal conductivity here, in order to satisfy a mechanical function, the plastics which is easy to make a configuration easily, for example, PPS etc., is sufficient. The field-like exoergic section 20 of this example also has very little short possibility of being hard to flow into the part where, as for the ink drop, power, such as the exoergic section and a thermal fuse, is flowing though an ink drop flows on elevated-temperature \*\*\*\*\* 204, since it is the above composition, therefore being based on an ink drop. <BR> [0018] In this example, as the exoergic section, although the self-thermolysis type ceramic heater was used, the heater made from a right temperature coefficient thermistor (PTC heater), a silicon rubber heater, etc. may be used. Moreover, irradiating light and heating it from a rear face as non-contact, to a belt 5 using a halogen lamp etc., is also considered.

[0019] Next, the energization belt 12 of this example is explained.

[0020] As mentioned above, two or more height 12a for carrying out the pressure welding of the recording paper 1 to a belt 5 is prepared in the energization belt 12 of this example. this height 12a -- each is taken as the configuration in which a pressure welding is possible by the cross direction 5 of the aforementioned energization belt 12, i.e., the aforementioned belt, covering the abbreviation full of the maximum recording width of the aforementioned recording paper 1 to the conveyance direction of the recording paper 1 in the perpendicular direction. Moreover, the point of the aforementioned height 12a, i.e., the contact section with the recording paper 1, is 100 micrometers of radius numbers. They are the following R configurations.

[0021] When the energization belt driving roller 11 rotates in the direction of C to the aforementioned energization belt 12, it moves in the aforementioned belt 5 and this direction (the direction of D in drawing 1), and has at least composition to which belt 5 front face of a portion on which the aforementioned field-like exoergic section 20 is arranged is made to carry out the pressure welding of the recording paper 1 in that case. As for the peripheral speed of the aforementioned energization belt driving roller 11, it is desirable that it is equal to the bearer rate of the recording paper 1 by the aforementioned belt 5.

[0022] Moreover, when the aforementioned height 12a contacts the ink drop which is not established on the recording paper 1, an ink drop adheres to this height 12a, and other portions of the recording paper 1 may be soiled after that. Therefore, in this example, it has the cleaner 13 which consists of material (for example, a sponge-like resin, cloth, paper, etc.) which is easy to absorb an ink drop above the aforementioned energization belt 12 so that each height 12a may be contacted.

[0023] Furthermore, in the case of the ink fuser of this example, the aforementioned energization belt 12 and a cleaner 13 prepare, the upper surface and side are being worn with the fixing covering 14, further, the DAFUTO covering 15 which can rotate is formed above this fixing covering 14 centering on pivot 15b, and the \*\*\*\*\* portion is setting space between this DAFUTO covering 15 and the aforementioned fixing covering 20 to DAFUTO section 15a. The aforementioned fixing covering 14 is considered as the composition which can observe the state of the recording paper 1 under conveyance from the exterior using what was formed at transparent plastics or a transparent punching metal, the wire gauze made from stainless steel, etc. Furthermore, two or more louver 14a which makes the portion and the aforementioned DAFUTO section 15a in which the energization belt 12 and a cleaner 13 exist open for free passage is formed in the upper surface, and the steam generated in case the ink drop on the recording paper 1 carries out evaporation fixing will be emitted to the fixing covering 14 into DAFUTO section 15a through two or more aforementioned louver 14a. moreover, the porosity plastics which fabricated the aforementioned DAFUTO covering 15 by the plastics of the shape of various sponge, and various sintering, for example, PVA, (polyvinyl alcohol) -- PVF (polyvinyl formal), PE (polyethylene), the sheet that infiltrated the calcium chloride into pulp are formed by the hygroscopic member

[0024] Thus, a user becomes the structure where neither the field-like exoergic section 20 nor belt 5 grade can be touched easily, by forming the fixing covering 14 and the DAFUTO covering 15. Furthermore, since the aforementioned field-like exoergic section 20 carries out the temperature up of the field-like exoergic section 20 to predetermined temperature beforehand for shortening of a heating up time, although a temperature gradient arises in the field-like exoergic section 20 and its circumference in that case, by forming the aforementioned fixing covering 14, discharge of heat will be barred, the aforementioned temperature gradient will become small, and loss of heat energy will be suppressed. Moreover, a fan 16 is installed in aforementioned DAFUTO section 15a, and it has composition which discharges the air and the steam in this DAFUTO section 15a outside.

[0025] Furthermore, in this example, since the operator of this equipment cancels the jam of the recording paper 1 in this equipment when the supporting point supports pivot 15b free [ rotation ] and the recording paper 1 raises a jam etc. in this equipment, the DAFUTO covering 15 can perform jam release by rotating the handle 21 which opened the DAFUTO covering 15 wide as it was shown in drawing 3 , and was connected with the drive roller 9.

[0026] When the recording paper 1 passes the ink fixing equipment of the above composition, ink drop 1a breathed out from the ink-jet recording head 3 carries out dryness fixing at the aforementioned recording paper 1, and is accumulated in the delivery tray 19 through between the delivery roller 17 and 18 after that.

[0027] Especially this invention is equipped with meanses (for example, an electric thermal-conversion object, a laser beam, etc.) to generate heat energy as energy used for the \*\* sake which breathes out ink also in the ink-jet record method, and brings about the outstanding effect in the recording head of the method which makes the change of state of ink occur with the aforementioned heat energy, and an ink-jet recording device.

[0028] About the typical composition and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called on-demand type and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the ONDE mantle type case By impressing at least one driving signal which gives the rapid temperature rise which corresponds to recording information and exceeds nucleate boiling Since generating \*\*\*\*\* and the heat operating surface of a recording head are made to carry out film boiling of the heat energy to an electric thermal-conversion object, a one to one correspondence is effectively carried out to this driving signal and the air bubbles in a liquid (ink) can be formed, it is effective. A liquid (ink) is made to breathe out through \*\*\*\*\* opening by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instantly, \*\*\*\* of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0029] The composition using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 445600 specification which indicate the composition arranged to a delivery which is indicated by each above-mentioned specification as composition of a recording head, the liquid route, and the field to which the heat operation section other than the combination composition (a straight-line-like liquid flow channel or right-angled liquid flow channel) of an electric thermal-conversion object is crooked is also effective in this invention. In addition, this invention is effective also as composition based on the Provisional-Publication-No. 59 No. 138461 official report per year which indicates the composition whose puncturing which

absorbs the pressure wave of the Provisional-Publication-No. 59 No. 123670 official report per year which indicates the composition which makes a common slit \*\*\*\*\* of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to \*\*\*\*\*.

[0030] Furthermore, although any of the composition which fills the length with the combination of two or more recording heads which are indicated by the specification mentioned above as a recording head of the full line type which has the length corresponding to the width of face of the maximum record medium which can record an ink-jet recording device, or the composition as a recording head of the piece formed in one are sufficient, this invention can demonstrate the effect mentioned above much more effectively.

[0031] In addition, this invention is effective when the electric connection with the main part of equipment and supply of the ink from the main part of equipment use the recording head of the exchangeable chip type which becomes possible, or the recording head of the cartridge type formed in the recording head itself in one by the main part of equipment being equipped.

[0032] Moreover, an adding-recovery means [ which is established as composition of the ink-jet recording device of this invention / against a recording head ], preliminary auxiliary means, etc. book It is effective in order to perform record stabilized by performing reserve regurgitation mode in which the preheating means by the heating elements different from a camp means, a cleaning means, pressurization or a suction means, an electric thermal-conversion pair, or this or these combination over a recording head and the regurgitation different from record are performed, if these are mentioned concretely.

[0033] Furthermore, as a recording mode of an ink-jet recording device, not only the recording mode of only mainstream colors, such as black, but a recording head is constituted in one, or this invention is very effective also in the equipment equipped with full color at least one by the color or color mixture of a different color even with two or more combination although it was good.

[0034] In this invention each example explained above, although ink is explained as a liquid, it is ink solidified less than [ a room temperature or it ], and since what carries out a temperature control is common as a temperature control is performed for ink itself at softening, a liquid, or an above-mentioned ink jet at a room temperature within the limits of 30 degrees C or more 70 degrees C or less and it is in the stable regurgitation range about the viscosity of ink, ink should just make the shape of liquid at the time of use record signal grant. In addition, [ whether positively the temperature up by heat energy is prevented because you make it use it as energy of \*\*\*\*\* from a solid state to the liquid state of ink, and ] Or it carries out whether the ink solidified in the state of neglect for the purpose of antiflashing of ink is used. Anyway, when reaching the thing and record medium which liquefy and ink-liquefied-unite ink and carry out the regurgitation by grant according to the record signal of heat energy, ink use of the property liquefied for the first time with heat energy, such as what it already begun to solidify, is also applicable to this invention. In such a case, ink is good for a porosity sheet crevice or a breakthrough which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the state where it was held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

[0035]

[Effect of the Invention] Since this invention is constituted as explained above, it does the following effects so.

(1) Since the pressure welding of the recorded member immediately after carrying out image formation is carried out to the heated conveyance belt covering the abbreviation full of the maximum recording width at least -- record-ed -- the aforementioned conveyance belt will surely be contacted, the heat of this conveyance belt is uniformly transmitted to the portion in which the aforementioned picture was formed, and the portion in which the picture of a member was formed can carry out dryness fixing of the ink in a short time, without degrading picture grace

(2) Since this ink is absorbed with the aforementioned cleaner even when ink adheres to the height of an energization belt by forming the cleaner which has absorptivity like a thing according to claim 2, in case the aforementioned height contacts a recorded member again, soiling this recorded member or destroying a picture is lost.

(3) By making the conveyance belt with which the pressure welding of the recorded member is carried out by making an exoergic means into the field-like exoergic section like a thing according to claim 4 carry out field contact, the aforementioned conveyance belt can be heated intensively and it becomes possible to perform dryness fixing of ink more efficiently.

(4) By forming the height of an energization belt like a thing according to claim 5 by the resin which has thermal resistance, the life of the energization belt with which heat is transmitted through a recorded member becomes long, and is economically advantageous.

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TECHNICAL FIELD

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[Industrial Application] this invention relates to the ink-jet recording device equipped with the mechanism established in the picture which was made to breathe out ink from an ink-jet recording head, and was formed in the recorded member.

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PRIOR ART

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[Description of the Prior Art] Conventionally, the thing that this kind of ink fuser performs dryness fixing of ink giving the heat ray of a direct infrared field as radiant heat to the ink in the record paper and by applying hot blast to the ink in the record paper has been proposed.

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EFFECT OF THE INVENTION

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[Effect of the Invention] Since this invention is constituted as explained above, it does the following effects so.

- (1) Since the pressure welding of the recorded member immediately after carrying out image formation is carried out to the heated conveyance belt covering the abbreviation full of the maximum recording width at least -- record-ed -- the aforementioned conveyance belt will surely be contacted, the heat of this conveyance belt is uniformly transmitted to the portion in which the aforementioned picture was formed, and the portion in which the picture of a member was formed can carry out dryness fixing of the ink in a short time, without degrading picture grace
- (2) Since this ink is absorbed with the aforementioned cleaner even when ink adheres to the height of an energization belt by forming the cleaner which has absorptivity like a thing according to claim 2, in case the aforementioned height contacts a recorded member again, soiling this recorded member or destroying a picture is lost.
- (3) By making the conveyance belt with which the pressure welding of the recorded member is carried out by making an exoergic means into the field-like exoergic section like a thing according to claim 4 carry out field contact, the aforementioned conveyance belt can be heated intensively and it becomes possible to perform dryness fixing of ink more efficiently.
- (4) By forming the height of an energization belt like a thing according to claim 5 by the resin which has thermal resistance, the life of the energization belt with which heat is transmitted through a recorded member becomes long, and is economically advantageous.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, there are the following troubles in the Prior art mentioned above.

(1) Since the wavelength field where ink carries out the water absorption of the water to the cellulose which is the principal component of paper when it is by remarkable \*\*\*\*\* is almost the same, The problem that the portion in which the ink of the recording paper has not appeared will carry out yellow discoloration if radiant heat is radiated so much when drying ink for a short time arises, or Moreover, if hot blast is given to the recording paper so much in order to dry ink for a short time, the ink drop in the record paper will flow and a picture will be destroyed.

(2) The rate absorbed among the heat energy generated from the heat source by the recording paper and the ink drop in the record paper will be low, and power consumption will become large.

(3) To the ink drop on the Records Department-ed material, if it does not heat uniformly, the concentration of a picture will not become uniform but will cause picture degradation, such as concentration nonuniformity.

[0004] this invention became in view of the trouble which the above-mentioned Prior art has, and it aims at offering the ink-jet recording device equipped with the ink fuser which can be established in ink in a short time, without reducing quality of image.

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MEANS

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[Means for Solving the Problem] this invention is characterized by the ink-jet recording device which breathes out ink from an ink-jet recording head to predetermined \*\*\*\* timing, and forms a picture in a recorded member possessing the following. The conveyance belt for conveying the recorded member immediately after forming a picture. The conveyance mechanical component which drives this conveyance belt synchronizing with the aforementioned \*\*\*\* timing. An exoergic means to heat the aforementioned conveyance belt. The energization belt stretched possible [ movement ] while two or more heights for carrying out the pressure welding of the aforementioned recorded member to the aforementioned conveyance belt covering the abbreviation full of the maximum recording width were prepared and the aforementioned recorded member was contacted with movement of the aforementioned conveyance belt.

[0006] Moreover, the thing equipped with the cleaner which consists of a member which has absorptivity arranged possible contact ] in the above-mentioned ink-jet recording device at the height of an energization belt, What has the energization belt driving section to which an energization belt is moved synchronizing with movement of a conveyance belt, and an exoergic means At least, what is the field-like exoergic section which carries out field contact, and the thing in which the height of an energization belt is formed by the resin which has thermal resistance are in the range of the conveyance belt with which the pressure welding of the recorded member is carried out by the height of an energization belt.

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[Translation done.]

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**OPERATION**

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[Function] Since it has the energization belt with which two or more heights which carry out the pressure welding of the recorded member immediately after forming a picture to the conveyance belt heated by the exoergic means covering the abbreviation full of the maximum recording width were prepared according to the ink-jet recording device of this invention. At least, the aforementioned conveyance belt will be contacted, the heat of this conveyance belt is transmitted to the aforementioned recorded member, and ink carries out dryness fixing of the portion in which the picture of the aforementioned Records Department-ed material was formed.

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**EXAMPLE**

[Example] Next, the example of this invention is explained with reference to a drawing.

[0009] Drawing 1 is the side elevation showing one example of the ink-jet recording device of this invention.

[0010] the ink in which this example was supplied from the ink supply pipe (un-illustrating) -- the record-ed from regurgitation section 3a of the ink-jet recording head 3 -- by carrying out the regurgitation to the recording paper 1 which is a member, it is the ink-jet recording device which forms a picture, and has the ink fuser for making the recording paper 1 carry out dryness fixing of the aforementioned ink

[0011] The timing to which the ink-jet recording head 3 of the aforementioned ink-jet recording device carries out the regurgitation of the ink is constituted so that it may be carried out synchronizing with the rotation of a platen roller 2 which conveys the recording paper 1.

[0012] The state of an ink drop immediately after being breathed out by the recording paper 1 in drawing 1 is expanded and expressed, and it is referred to as 1a. The recording paper 1 with which the picture was formed of the ink-jet recording head 3 is led in the background of an image formation side by guide section 4a formed with a part of lower frame 4 on the belt 5 for recording paper conveyance stretched by the drive roller 9 and the follower roller 6. The energization belt 12 with which two or more height 12a for carrying out the pressure welding of the recording paper 1 to this belt 5 front face was prepared above this belt 5 is stretched by the energization belt driving roller 11 and the energization belt follower roller 10. With these belts 5 and energization belts 12, the pressure welding of the recording paper 1 laid on the aforementioned belt 5 will be carried out to the belt 5 aforementioned front face. Moreover, inside the aforementioned belt 5, the field-like exoergic section 20 which carries out field contact and which is an exoergic means is formed in the up inside.

[0013] The quality of the material which can also fully bear the tensile stress which does not start fatigue breaking even if it is desirable to make the heat with which the aforementioned field-like exoergic section 20 emits a belt 5 here conduct to per unit time as so much from a rear face to a front face as possible and a belt 5 repeats incursion according to the life of this equipment, corresponding to the curvature of the drive roller 9 and the follower roller 6 further, but is produced with compression spring 9, and thickness are required. In the case of the usual business machine, the durable rotational frequency of a belt 5 is number 1 million rotation from hundreds of thousands rotations. The seamless belt made from nickel processed by the electro foaming method in consideration of the above-mentioned demand function in this example is used. The thickness of a belt 5 is several micrometers. It is desirable to be selected in the range of 100 microns of shell numbers, and it is 50 micrometers at this example. It carried out. Moreover, the time when the radius of the drive roller 9 or the follower roller 6 cannot take greatly according to product specification, the time when the bearer rate of a belt 5 is required for a bearer rate (100mm/s or several 100mm, and several 1000mm), and the belt made from stainless steel which the durable rotational frequency carried out plasma arc welding of millions and the sheet metal made from the stainless steel which carried out rolling hardening tens of millions revolutions when required, processed it into the belt 5, and added like annealing and the roll turner further are sufficient. Hard Vickers hardness Hv of the belt made from stainless steel at this time is hundreds, and about Hv =200-800 is desirable.

[0014] A problem is not produced when the temperature of the field-like exoergic section 20 of degradation of the belt 5 by the field-like exoergic section 20 later mentioned when a belt 5 is formed with a metal like \*\*\*\* is about 600 degrees C or less. It has controlled to become the range whose skin temperature of elevated-temperature \*\*\*\*\* 204 (refer to drawing 2) of the field-like exoergic section 20 is 100 degrees C - 180 degrees C in this example. As mentioned above, since the skin temperature of the field-like exoergic section 20 is 600 degrees C or less, The quality of the material of a belt 5 A polyimide (PI), polyphenylene sulfide (PPS), A polyether ape phon (PES), a polyimidoamide (PIA), Plastics, such as a polyamide (PA) and a polyethylene terephthalate (PET), is formed into a seamless belt by inflation molding etc. By rolling out after that, a mechanical strength may be increased and the aforementioned sheet plastic by which biaxial extension was carried out beforehand may be belt-ized by heat welding. in this case, since the extension process has finished before belt-izing, a large cost cut should be realized by belt-izing by heat welding, and if the shape of a straight chain PPS (the shape of urea) developed further recently is used, don't perform an extension process but carry out for obtaining a required mechanical strength and belt-izing by fabrication -- carry out for belt-izing by heat welding -- it becomes with a still larger cost cut Also setting, when the belt made from plastics is used, the thickness is several micrometers. 100 micrometers of shell numbers Although a grade is appropriate, it is 10 micrometers of numbers as a result of an experiment. A grade is desirable. Now, as for the drive roller 9, it is desirable for thermal resistance, such as silicone rubber or a fluororubber, to have a front face at least, and to cover the coefficient of friction mu to this belt 5 with the highest possible material or more by 0.1 to the above-mentioned belt 5. Moreover, the aforementioned follower roller 6 is formed by plastics, such as PET with thermal resistance, a polycarbonate (PC), and PPS, or aluminum, the sintered alloy, etc. This follower roller 6 is supported to the lower frame 4 by the supporter material 7 which can move in the direction of B in drawing. This supporter material 7 is always energized in the direction of C in drawing by the compression spring 8 which fixed the end to the bottom frame 4 of the above in order to make the aforementioned belt 5 generate tension. Furthermore, the peripheral speed of a belt 5 is the same as the peripheral speed of the aforementioned platen roller 2, or it is set up so that it may become quicker than it.

[0015] Next, the field-like exoergic section 20 is explained with reference to drawing 2 .

[0016] The field-like exoergic section 20 of this example is equipped with elevated-temperature \*\*\*\*\* 204 which has

rigidity and consists of material, such as aluminum with high thermal conductivity, and touches the belt 5 by this elevated-temperature \*\*\*\*\* 204. For this elevated-temperature \*\*\*\*\* 204, the flatness of a perpendicular direction is hundreds of micrometers to the conveyance direction of the recording paper 1. Irregularity is managed so that it may become less than. Elevated-temperature \*\*\*\*\* 204 of this example is formed with aluminum, performs alumite processing to the contact surface with the belt 5, and is raising surface hardness to it. Therefore, it is rare to wear elevated-temperature \*\*\*\*\* 204 out by sliding with a belt 5. Furthermore, the insulating material 201 which thermal conductivity becomes from a high material (silicone rubber is used in this example) of isolation voltage highly is stuck on the inferior surface of tongue of elevated-temperature \*\*\*\*\* 204. And four heaters 202a, 202b, 202c, and 202d which consist of self-thermolysis type ceramic heaters carry out field contact, and are installed in the inferior surface of tongue of the aforementioned insulating material 201 side by side. To these four heaters 202a, 202b, 202c, and 202d, thermal fuse 203b in contact with thermal fuse 203a in contact with this heater 202a and heater 202b and heater 202c and heater 202d is prepared.

[0017] Moreover, if the electric resistance value has the same composition and Heaters 202a, 202b, 202c, and 202d impress the same current to these heaters 202a, 202b, 202c, and 202d in this example, the temperature up will be carried out almost similarly. Furthermore, a Heaters [ 202a 202b, 202c, and 202d ] rear-face side has thermal resistance, and is covered with the heat insulator 205 with high electric insulation. Although a heat insulator 205 has [ a low, asbestos, a ceramic, etc. ] desirable thermal conductivity here, in order to satisfy a mechanical function, the plastics which is easy to make a configuration easily, for example, PPS etc., is sufficient. The field-like exoergic section 20 of this example also has very little short possibility of being hard to flow into the part where, as for the ink drop, power, such as the exoergic section and a thermal fuse, is flowing though an ink drop flows on elevated-temperature \*\*\*\*\* 204, since it is the above composition, therefore being based on an ink drop.

[0018] In this example, as the exoergic section, although the self-thermolysis type ceramic heater was used, the heater made from a right temperature coefficient thermistor (PTC heater), a silicon rubber heater, etc. may be used. Moreover, irradiating light and heating it from a rear face as non-contact, to a belt 5 using a halogen lamp etc., is also considered.

[0019] Next, the energization belt 12 of this example is explained.

[0020] As mentioned above, two or more height 12a for carrying out the pressure welding of the recording paper 1 to a belt 5 is prepared in the energization belt 12 of this example. this height 12a -- each is taken as the configuration in which a pressure welding is possible by the cross direction 5 of the aforementioned energization belt 12, i.e., the aforementioned belt, covering the abbreviation full of the maximum recording width of the aforementioned recording paper 1 to the conveyance direction of the recording paper 1 in the perpendicular direction. Moreover, the point of the aforementioned height 12a, i.e., the contact section with the recording paper 1, is 100 micrometers of radius numbers. They are the following R configurations.

[0021] When the energization belt driving roller 11 rotates in the direction of C to the aforementioned energization belt 12, it moves in the aforementioned belt 5 and this direction (the direction of D in drawing 1 ), and has at least composition to which belt 5 front face of a portion on which the aforementioned field-like exoergic section 20 is arranged is made to carry out the pressure welding of the recording paper 1 in that case. As for the peripheral speed of the aforementioned energization belt driving roller 11, it is desirable that it is equal to the bearer rate of the recording paper 1 by the aforementioned belt 5.

[0022] Moreover, when the aforementioned height 12a contacts the ink drop which is not established on the recording paper 1, an ink drop adheres to this height 12a, and other portions of the recording paper 1 may be soiled after that. Therefore, in this example, it has the cleaner 13 which consists of material (for example, a sponge-like resin, cloth, paper, etc.) which is easy to absorb an ink drop above the aforementioned energization belt 12 so that each height 12a may be contacted.

[0023] Furthermore, in the case of the ink fuser of this example, the aforementioned energization belt 12 and a cleaner 13 prepare, the upper surface and side are being worn with the fixing covering 14, further, the DAFUTO covering 15 which can rotate is formed above this fixing covering 14 centering on pivot 15b, and the \*\*\*\*\* portion is setting space between this DAFUTO covering 15 and the aforementioned fixing covering 20 to DAFUTO section 15a. The aforementioned fixing covering 14 is considered as the composition which can observe the state of the recording paper 1 under conveyance from the exterior using what was formed at transparent plastics or a transparent punching metal, the wire gauze made from stainless steel, etc. Furthermore, two or more louver 14a which makes the portion and the aforementioned DAFUTO section 15a in which the energization belt 12 and a cleaner 13 exist open for free passage is formed in the upper surface, and the steam generated in case the ink drop on the recording paper 1 carries out evaporation fixing will be emitted to the fixing covering 14 into DAFUTO section 15a through two or more aforementioned louver 14a. moreover, the porosity plastics which fabricated the aforementioned DAFUTO covering 15 by the plastics of the shape of various sponge, and various sintering, for example, PVA, (polyvinyl alcohol) -- PVF (polyvinyl formal), PE (polyethylene), the sheet that infiltrated the calcium chloride into pulp are formed by the hygroscopic member

[0024] Thus, a user becomes the structure where neither the field-like exoergic section 20 nor belt 5 grade can be touched easily, by forming the fixing covering 14 and the DAFUTO covering 15. Furthermore, since the aforementioned field-like exoergic section 20 carries out the temperature up of the field-like exoergic section 20 to predetermined temperature beforehand for shortening of a heating up time, although a temperature gradient arises in the field-like exoergic section 20 and its circumference in that case, by forming the aforementioned fixing covering 14, discharge of heat will be barred, the aforementioned temperature gradient will become small, and loss of heat energy will be suppressed. Moreover, a fan 16 is installed in aforementioned DAFUTO section 15a, and it has composition which discharges the air and the steam in this DAFUTO section 15a outside.

[0025] Furthermore, in this example, since the operator of this equipment cancels the jam of the recording paper 1 in this equipment when the supporting point supports pivot 15b free [ rotation ] and the recording paper 1 raises a jam etc. in this equipment, the DAFUTO covering 15 can perform jam release by rotating the handle 21 which opened the DAFUTO covering 15 wide as it was shown in drawing 3 , and was connected with the drive roller 9.

[0026] When the recording paper 1 passes the ink fixing equipment of the above composition, ink drop 1a breathed out from the ink-jet recording head 3 carries out dryness fixing at the aforementioned recording paper 1, and is accumulated in the delivery tray 19 through between the delivery roller 17 and 18 after that.

[0027] Especially this invention is equipped with meansas (for example, an electric thermal-conversion object, a laser beam,

etc.) to generate heat energy as energy used for the \*\* sake which breathes out ink also in the ink-jet record method, and brings about the outstanding effect in the recording head of the method which makes the change of state of ink occur with the aforementioned heat energy, and an ink-jet recording device.

[0028] About the typical composition and typical principle, what is performed using the fundamental principle currently indicated by the U.S. Pat. No. 4723129 specification and the 4740796 specification, for example is desirable. Although this method is applicable to both the so-called on-demand type and a continuous system On the electric thermal-conversion object which is especially arranged corresponding to the sheet and liquid route where the liquid (ink) is held in the ONDE mantle type case By impressing at least one driving signal which gives the rapid temperature rise which corresponds to recording information and exceeds nucleate boiling Since generating \*\*\*\*\* and the heat operating surface of a recording head are made to carry out film boiling of the heat energy to an electric thermal-conversion object, a one to one correspondence is effectively carried out to this driving signal and the air bubbles in a liquid (ink) can be formed, it is effective. A liquid (ink) is made to breathe out through \*\*\*\*\* opening by growth of these air bubbles, and contraction, and at least one drop is formed. If this driving signal is made into the shape of a pulse form, since growth contraction of air bubbles will be performed appropriately instantly, \*\*\*\* of a liquid (ink) excellent in especially responsibility can be attained, and it is more desirable. As a driving signal of the shape of this pulse form, what is indicated by the U.S. Pat. No. 4463359 specification and the 4345262 specification is suitable. In addition, if the conditions indicated by the U.S. Pat. No. 4313124 specification of invention about the rate of a temperature rise of the above-mentioned heat operating surface are adopted, further excellent record can be performed.

[0029] The composition using the U.S. Pat. No. 4558333 specification and U.S. Pat. No. 445600 specification which indicate the composition arranged to a delivery which is indicated by each above-mentioned specification as composition of a recording head, the liquid route, and the field to which the heat operation section other than the combination composition (a straight-line-like liquid flow channel or right-angled liquid flow channel) of an electric thermal-conversion object is crooked is also effective in this invention. In addition, this invention is effective also as composition based on the Provisional-Publication-No. 59 No. 138461 official report per year which indicates the composition whose puncturing which absorbs the pressure wave of the Provisional-Publication-No. 59 No. 123670 official report per year which indicates the composition which makes a common slit \*\*\*\*\* of an electric thermal-conversion object to two or more electric thermal-conversion objects, or heat energy is made to correspond to \*\*\*\*\*.

[0030] Furthermore, although any of the composition which fills the length with the combination of two or more recording heads which are indicated by the specification mentioned above as a recording head of the full line type which has the length corresponding to the width of face of the maximum record medium which can record an ink-jet recording device, or the composition as a recording head of the piece formed in one are sufficient, this invention can demonstrate the effect mentioned above much more effectively.

[0031] In addition, this invention is effective when the electric connection with the main part of equipment and supply of the ink from the main part of equipment use the recording head of the exchangeable chip type which becomes possible, or the recording head of the cartridge type formed in the recording head itself in one by the main part of equipment being equipped.

[0032] Moreover, an adding-recovery means [ which is established as composition of the ink-jet recording device of this invention / against a recording head ], preliminary auxiliary means, etc. book It is effective in order to perform record stabilized by performing the preheating means by the heating elements different from a camp means, a cleaning means, pressurization or a suction means, an electric thermal-conversion pair, or this or these combination over a recording head, and reserve \*\*\*\* mode in which \*\*\*\* different from record is performed, if these are mentioned concretely.

[0033] Furthermore, as a recording mode of an ink-jet recording device, not only the recording mode of only mainstream colors, such as black, but a recording head is constituted in one, or this invention is very effective also in the equipment equipped with full color at least one by the color or color mixture of a different color even with two or more combination although it was good.

[0034] In this invention each example explained above, although ink is explained as a liquid, it is ink solidified less than [ a room temperature or it ], and since what carries out a temperature control is common as a temperature control is performed for ink itself at softening, a liquid, or an above-mentioned ink jet at a room temperature within the limits of 30 degrees C or more 70 degrees C or less and it is in the stable regurgitation range about the viscosity of ink, ink should just make the shape of liquid at the time of use record signal grant. In addition, [ whether positively the temperature up by heat energy is prevented because you make it use it as energy of \*\*\*\*\* from a solid state to the liquid state of ink, and ] Or it carries out whether the ink solidified in the state of neglect for the purpose of antiflashing of ink is used. Anyway, when reaching the thing and record medium which liquefy and ink-liquefied-untie ink and carry out the regurgitation by grant according to the record signal of heat energy, ink use of the property liquefied for the first time with heat energy, such as what it already begun to solidify, is also applicable to this invention. In such a case, ink is good for a porosity sheet crevice or a breakthrough which is indicated by JP,54-56847,A or JP,60-71260,A also as liquefied or a gestalt which counters to an electric thermal-conversion object in the state where it was held as a solid. In this invention, the most effective thing performs the film-boiling method mentioned above to each ink mentioned above.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the side elevation showing one example of the ink-jet recording device of this invention.

[Drawing 2] It is the cross section showing an example of the composition of the field-like exoergic section.

[Drawing 3] It is the side elevation showing the state where DAFUTO covering of the ink fuser of an ink-jet recording device shown in drawing 1 was opened.

[Description of Notations]

- 1 Recording Paper
- 1a Ink drop
- 2 Platen Roller
- 3 Ink-Jet Recording Head
- 3a Regurgitation section
- 4 Lower Frame
- 4a Guide section
- 5 Belt
- 6 Follower Roller
- 7 Supporter Material
- 8 Compression Spring
- 9 Drive Roller
- 10 Energization Belt Follower Roller
- 11 Energization Belt Driving Roller
- 12 Energization Belt
- 12a Height
- 13 Cleaner
- 14 Fixing Covering
- 14a Louver
- 15 DAFUTO Covering
- 15a DAFUTO section
- 15b Pivot
- 16 Fan
- 17 18 Delivery roller
- 19 Delivery Tray
- 20 Field-like Exoergic Section
- 21 Handle
- 201 Insulating Material
- 202a, 202b, 202c, 202d Heater
- 203a, 203b Thermal fuse
- 204 Elevated-Temperature \*\*\*\*\*
- 205 Heat Insulator

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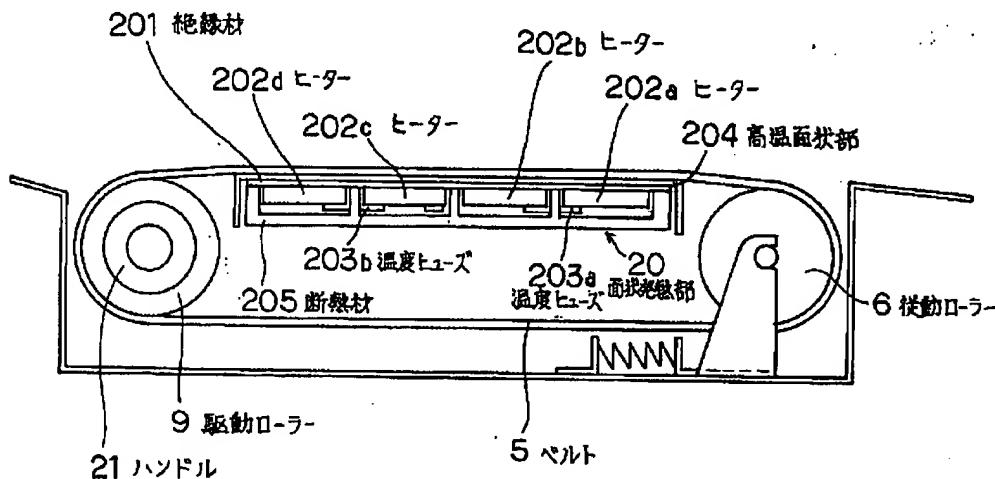
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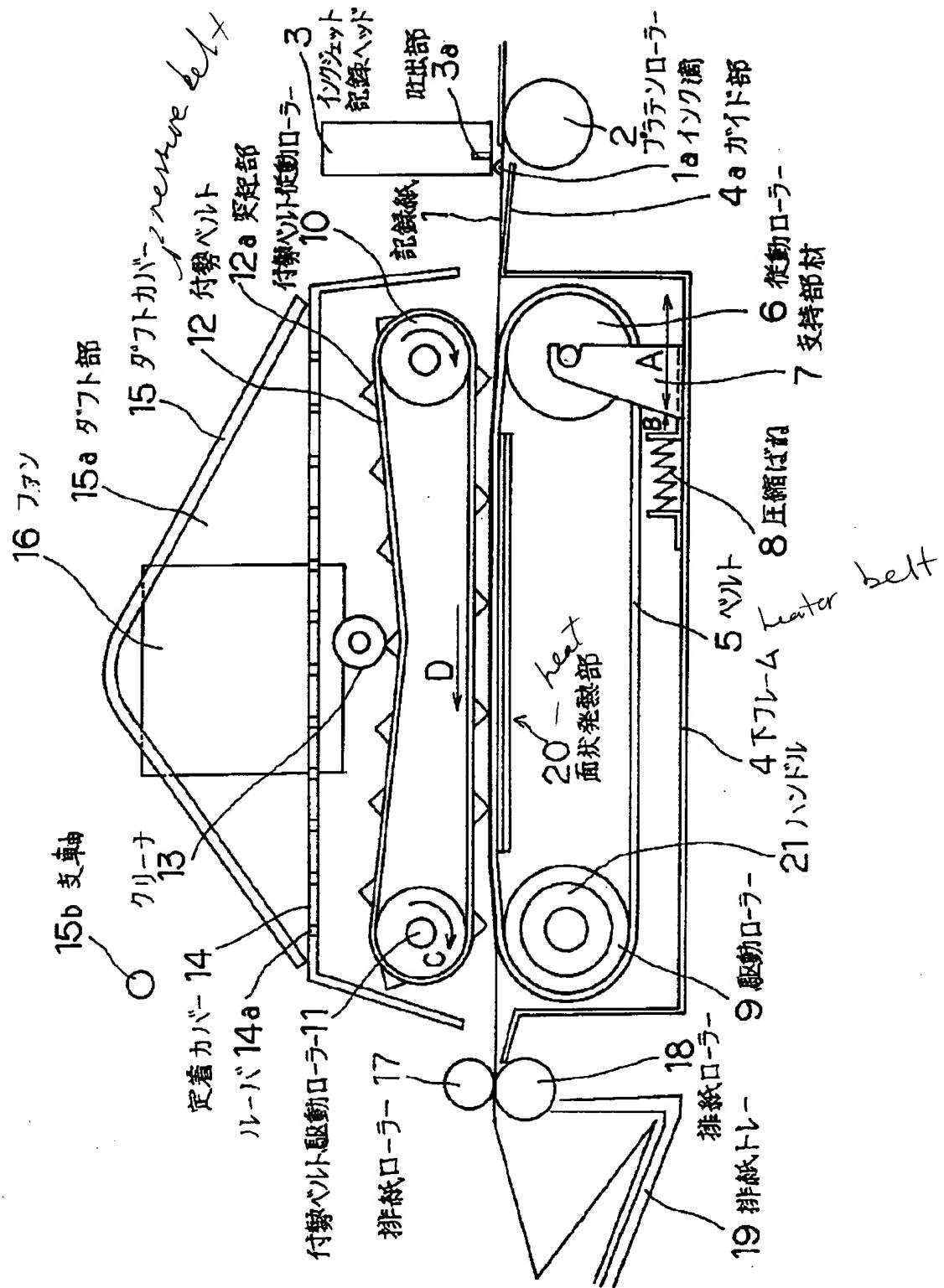
DRAWINGS

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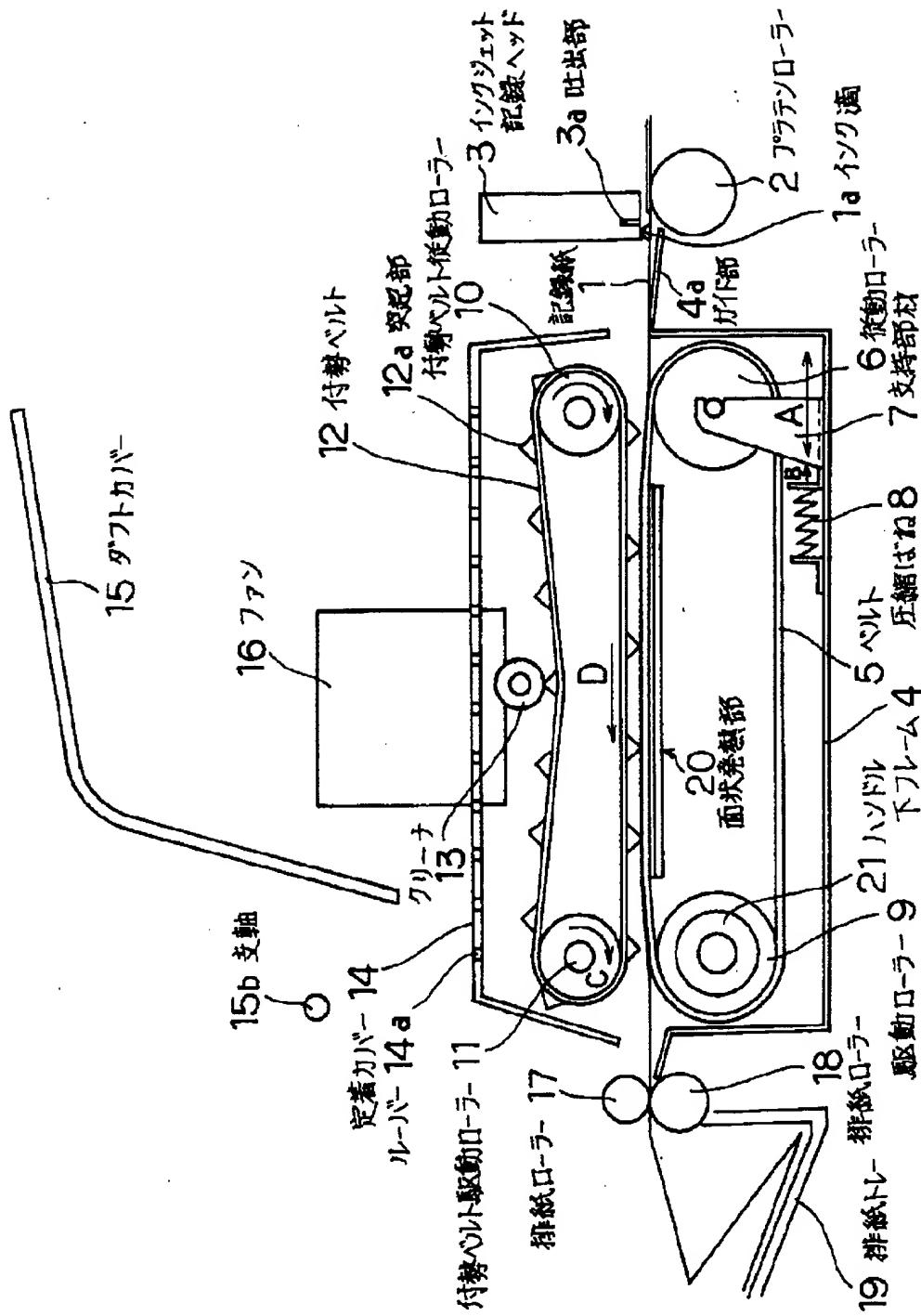
[Drawing 2]



[Drawing 1]



[Drawing 3]



[Translation done.]

CLIPPEDIMAGE= JP405112000A

PAT-NO: JP405112000A

DOCUMENT-IDENTIFIER: JP 05112000 A

TITLE: INK JET RECORDING APPARATUS

PUBN-DATE: May 7, 1993

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APPL-NO: JP03275765

APPL-DATE: October 23, 1991

INT-CL (IPC): B41J002/01;B41J013/08 ;B41J029/00 ;B41J029/17

US-CL-CURRENT: 347/102,400/635

ABSTRACT:

PURPOSE: To fix an ink within a short time without lowering image quality.

CONSTITUTION: A feed belt 5 for feeding recording paper 1 immediately after ink is emitted from an ink jet recording head 3 in predetermined emitting timing to form an ink image, a drive roller 9 driving the belt 5 in synchronous relation to the emitting timing, the planar heating part 20 heating the belt and a plurality of projections 12a for bringing the recording paper 1 into contact with the belt 5 under pressure over the almost whole width of the max.

recording width thereof are provided. Further, an energizing belt 12 is provided under tension so as to be movable in contact with the recording paper with the movement of the belt 5.

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13/08		9210-2C		
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審査請求 未請求 請求項の数5(全8頁) 最終頁に続く

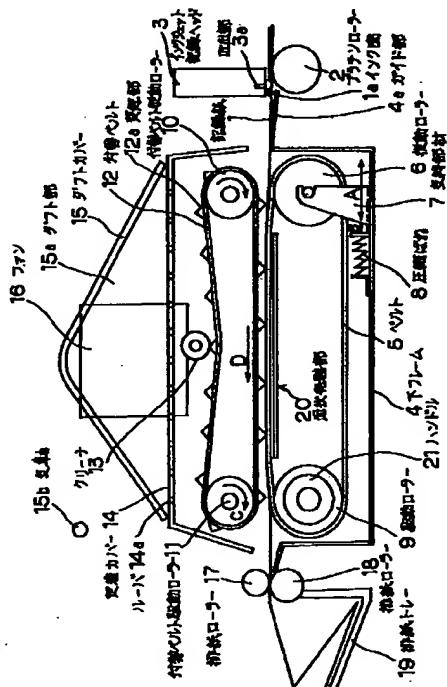
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(54)【発明の名称】 インクジェット記録装置

(57)【要約】

【目的】 画質を低下させることなく短時間でインクを定着させる。

【構成】 インクジェット記録ヘッド3から所定の吐出タイミングでインクを吐出して画像を形成した直後の記録紙1を搬送するための搬送用のベルト5と、該ベルト5を、前記吐出タイミングに同期して駆動する駆動ローラー9と、前記ベルト5を加熱する面状発熱部20と、前記記録紙1を、その最大記録幅の略全幅にわたって前記ベルト5に圧接するための複数の突起部14aが設けられ、前記ベルト5の移動にともなって前記記録紙1に接触しながら移動可能に張設された付勢ベルト14とを備えている。



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## 【特許請求の範囲】

【請求項1】 インクジェット記録ヘッドから所定の吐出タイミングでインクを吐出して被記録部材に画像を形成するインクジェット記録装置において、  
画像が形成された直後の被記録部材を搬送するための搬送ベルトと、  
該搬送ベルトを前記吐出タイミングに同期して駆動する搬送駆動部と、  
前記搬送ベルトを加熱する発熱手段と、  
前記被記録部材を、その最大記録幅の略全幅にわたって前記搬送ベルトに圧接するための複数の突起部が設けられ、前記搬送ベルトの移動にともなって前記被記録部材に接触しながら移動可能に張設された付勢ベルトとを備えたことを特徴とするインクジェット記録装置。

【請求項2】 付勢ベルトの突起部に接触可能に配置された、吸水性を有する部材からなるクリーナを備えたことを特徴とする請求項1記載のインクジェット記録装置。

【請求項3】 付勢ベルトを搬送ベルトの移動に同期して移動させる付勢ベルト駆動部を有することを特徴とする請求項1あるいは2記載のインクジェット記録装置。

【請求項4】 発熱手段は、少なくとも付勢ベルトの突起部によって被記録部材が圧接される搬送ベルトの範囲に面接触する面状発熱部であることを特徴とする請求項1、2あるいは3記載のインクジェット記録装置。

【請求項5】 付勢ベルトの突起部が耐熱性を有する樹脂で形成されていることを特徴とする請求項1、2、3あるいは4記載のインクジェット記録装置。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】本発明はインクジェット記録ヘッドからインクを吐出させて被記録部材に形成した画像の定着を行なう機構を備えたインクジェット記録装置に関する。

## 【0002】

【従来の技術】従来、この種のインク定着機構は、記録紙上のインクに対して直接赤外線領域の熱線を輻射熱として与えることや、熱風を記録紙上のインクに当てるにより、インクの乾燥定着を行うというものが提案されてきた。

## 【0003】

【発明が解決しようとする課題】しかしながら、上述した従来の技術では下記のような問題点がある。

(1) インクが水をかなりの量含んでいる場合には紙の主成分であるセルロースと水の吸収する波長領域がほぼ同じであるため、短時間でインクを乾燥させると、輻射熱を多量に輻射すると、記録紙のインクの載っていない部分が黄変色してしまうという問題が生じてしまったり、また、短時間でインクを乾燥させるために熱風を多量に記録紙に与えると記録紙上のインク滴が流れてしま

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い画像を破壊してしまう。

(2) 热源から発生した熱エネルギーのうち、記録紙および記録紙上のインク滴に吸収される割合が低く、消費電力が大きくなってしまう。

(3) 被記録部材上のインク滴に対し、均一に加熱していかないと画像の濃度が均一にならず濃度ムラ等画像劣化の原因となる。

【0004】本発明は、上記従来の技術が有する問題点に鑑みてなられたもので、画質を低下させることなく短時間でインクを定着することができるインク定着機構を備えたインクジェット記録装置を提供することを目的としている。

## 【0005】

【課題を解決するための手段】本発明は、インクジェット記録ヘッドから所定の吐出タイミングでインクを吐出して被記録部材に画像を形成するインクジェット記録装置において、画像が形成された直後の被記録部材を搬送するための搬送ベルトと、該搬送ベルトを前記吐出タイミングに同期して駆動する搬送駆動部と、前記搬送ベルトを加熱する発熱手段と、前記被記録部材を、その最大記録幅の略全幅にわたって前記搬送ベルトに圧接するための複数の突起部が設けられ、前記搬送ベルトの移動にともなって前記被記録部材に接触しながら移動可能に張設された付勢ベルトとを備えたものである。

【0006】また、上記インクジェット記録装置において、付勢ベルトの突起部に接触可能に配置された、吸水性を有する部材からなるクリーナを備えたものと、付勢ベルトを、搬送ベルトの移動に同期して移動させる付勢ベルト駆動部を有するものと、発熱手段は、少なくとも、付勢ベルトの突起部によって被記録部材が圧接される搬送ベルトの範囲に面接触する面状発熱部であるものと、付勢ベルトの突起部が耐熱性を有する樹脂で形成されているものとがある。

## 【0007】

【作用】本発明の、インクジェット記録装置によれば、発熱手段によって加熱された搬送ベルトに、画像が形成された直後の被記録部材を、その最大記録幅の略全幅にわたって圧接する複数の突起部が設けられた付勢ベルトを備えているので、少なくとも、前記被記録部材の画像が形成された部分は前記搬送ベルトに接触することになり、該搬送ベルトの熱が前記被記録部材に伝達されて、インクが乾燥定着する。

## 【0008】

【実施例】次に、本発明の実施例について図面を参照して説明する。

【0009】図1は本発明のインクジェット記録装置の一実施例を示す側面図である。

【0010】本実施例は、インク供給管(不図示)より供給されたインクをインクジェット記録ヘッド3の吐出部3aから被記録部材である記録紙1に吐出することに

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よって画像を形成するインクジェット記録装置であり、前記インクを記録紙1に乾燥定着させるためのインク定着機構を備えている。

【0011】前記インクジェット記録装置のインクジェット記録ヘッド3がインクを吐出するタイミングは記録紙1を搬送するプラテンローラー2の回転に同期して行われるように構成している。

【0012】図1において記録紙1に吐出された直後のインク滴の状態を拡大して表わし、1aとする。インクジェット記録ヘッド3により、画像が形成された記録紙1は画像形成面の裏側を下フレーム4の一部で形成されたガイド部4aによって、駆動ローラー9と従動ローラー6とに張設された記録紙搬送用のベルト5上に導かれる。このベルト5の上方には、該ベルト5表面に記録紙1を圧接するための複数の突起部12aが設けられた付勢ベルト12が付勢ベルト駆動ローラー11と付勢ベルト従動ローラー10とに張設されている。これらのベルト5と付勢ベルト12とによって、前記ベルト5上に載置された記録紙1は前記ベルト5表面に圧接されることになる。また、前記ベルト5の内側には、その上部内面に面接触する、発熱手段である面状発熱部20が設けられている。

【0013】ここで、ベルト5は、前記面状発熱部20が発する熱を単位時間当たりに裏面から表面になるべく多量に伝導させることができ望ましく、また本装置の耐用年数に応じ、さらにベルト5が駆動ローラー9と従動ローラー6の曲率に応じて、屈曲をくり返しても疲労破壊を起こさず、圧縮ばね9によって生じる引張り応力にも十分に耐えうる材質および厚みが要求される。通常の事務機の場合ベルト5の耐用回転数は数十万回転から数百万回転である。本実施例においては上述の要求機能を考慮し、エレクトロフォーミング法で加工したNイ製シームレスベルトを使用している。ベルト5の厚さは数μmから数百ミクロンの範囲で選定されることが望ましく、本実施例では50μmとした。また、製品仕様に応じて駆動ローラー9や従動ローラー6の半径が大きくとれないときや、ベルト5の搬送速度が秒速100mmないし、数100mm、数1000mmの搬送速度が必要なときや、耐用回転数が数百万、数千万回転必要なときは、圧延硬化したステンレス製薄板をプラズマ溶接してベルト5に加工し、さらに焼きなましと圧延工程を加えたステンレス製ベルトでも良い。このときのステンレス製ベルトのハードビッカース硬度Hvは数百であり、Hv = 200~800程度が望ましい。

【0014】上述のごとく金属でベルト5を形成した場合、後述する面状発熱部20によるベルト5の劣化は、面状発熱部20の温度が約600°C以下である場合問題は生じない。本実施例においては面状発熱部20の高温面状部204(図2参照)の表面温度が100°C~180°Cの範囲になるようコントロールしている。前述のよ

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うに、面状発熱部20の表面温度が600°C以下であるため、ベルト5の材質はポリイミド(PI)、ポリフェニレンサルファイト(PPS)、ポリエーテルサルファン(PES)、ポリイミドアミド(PIA)、ポリアミド(PA)、ポリエチレンテレフタレート(PET)等のプラスチックをインフレーション成形等によりシームレスベルト化し、その後圧延を行うことにより機械的強度を増しても良いし、予め2軸延伸された前記プラスチックシートを熱溶着によってベルト化しても良い。この

10 10場合ベルト化する前に延伸工程が終わっているため熱溶着によってベルト化することにより大幅なコストダウンが実現し、さらに最近開発された直鎖状(ユリア状)PPSを使用すれば、延伸工程を行わず、必要な機械的強度が得られ成形でベルト化するにせよ、熱溶着によりベルト化するにせよ、さらに大幅なコストダウンとなる。プラスチック製ベルトを使用した場合においてもその厚さは数μmから数百μm程度が妥当であるが、実験の結果数十μm程度が望ましい。さて、駆動ローラー9は、上述のベルト5に対して、少なくとも表面がシリコンゴムまたはフッ素ゴム等の、耐熱性があり、該ベルト5に対しても摩擦係数μが0.1以上でできるだけ高い材料で覆われることが望ましい。また、前記従動ローラー6は耐熱性があるPET、ポリカーボネイト(PC)、PPS等のプラスチック、あるいはアルミ、焼結合金等で形成されている。この従動ローラー6は、下フレーム4に対して図中B方向に移動可能な支持部材7に支持されている。該支持部材7は、前記ベルト5に張力を発生させるため、一端を前記下フレーム4に固定した圧縮ばね8により図中C方向に常時付勢されている。さらに、

20 20ベルト5の周速は、前記プラテンローラー2の周速と同じあるいはそれより速くなるように設定されている。

【0015】次に、面状発熱部20について図2を参照して説明する。

【0016】本実施例の面状発熱部20は、剛性を有し、かつ熱伝導率の高い、アルミ等の材料からなる高温面状部204を備え、該高温面状部204にてベルト5と接触している。この高温面状部204は、記録紙1の搬送方向に対して垂直な方向の平面度が、数百μm以内となるように凹凸が管理されている。本実施例の高温面状部204は、アルミで形成したものであり、そのベルト5との接触面には、アルマイト処理を行って表面硬度を上げている。そのため、ベルト5との摺動により高温面状部204が摩耗することは少ない。さらに、高温面状部204の下面には、熱伝導率が高く、かつ、絶縁耐圧の高い材料(本実施例ではシリコンゴムを使用)からなる絶縁材201が貼付けられている。そして、前記絶縁材201の下面に、例えば、自己放熱型セラミックヒーターからなる4個のヒーター202a、202b、202c、202dが、面接触して並設されている。この4個のヒーター202a、202b、202c、202

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dに対しては、該ヒーター202aとヒーター202bとに接触する温度ヒューズ203aと、ヒーター202cとヒーター202dとに接触する温度ヒューズ203bとが設けられている。

【0017】また、本実施例においてヒーター202a、202b、202c、202dは、その電気抵抗値が同じ構成となっており、該ヒーター202a、202b、202c、202dに対して同じ電流を印加すれば、ほぼ同様に昇温していくことになる。さらに、ヒーター202a、202b、202c、202dの裏面側は耐熱性を有し、かつ電気絶縁性が高い断熱材205で覆われている。ここで断熱材205は熱伝導率が低い、石綿、セラミック等が好ましいが、機械的な機能を満足するため、形状を容易に作り易いプラスチック、例えばPPS等でも良い。本実施例の面状発熱部20は、上述のような構成であるため、仮にインク滴が高温面状部204上に流れたとしてもそのインク滴は、発熱部や温度ヒューズ等の電力が流れている箇所に流入しにくく、したがってインク滴によるショートの可能性も非常に少ない。

【0018】本実施例では、発熱部として、自己放熱型セラミックヒーターを用いたが、その他に、正温度係数サーミスタ製ヒーター(PTCヒーター)やシリコンラバーヒーター等でもよい。また、ハロゲンランプ等を用いて、ベルト5に非接触として裏面から光を照射して加熱することも考えられる。

【0019】次に、本実施例の付勢ベルト12について説明する。

【0020】前述したように、本実施例の付勢ベルト12には記録紙1をベルト5に圧接するための複数の突起部12aが設けられている。この突起部12aそれぞれは、前記付勢ベルト12の幅方向、すなわち前記ベルト5により記録紙1の搬送方向に対して垂直な方向に前記記録紙1の最大記録幅の略全幅にわたって圧接可能な形状としている。また、前記突起部12aの先端部、すなわち記録紙1との接触部は半径数百μm以下のR形状となっている。

【0021】前記付勢ベルト12には付勢ベルト駆動ローラー11がC方向に回転することにより、前記ベルト5と同方向(図1中D方向)に移動し、その際少なくとも、前記面状発熱部20が配置されている部分のベルト5表面に記録紙1を圧接させる構成となっている。前記付勢ベルト駆動ローラー11の周速は、前記ベルト5による記録紙1の搬送速度と等しいことが望ましい。

【0022】また、前記突起部12aが記録紙1上の未定着のインク滴に接触した場合、該突起部12aにインク滴が付着して、その後、記録紙1の他の部分を汚してしまう可能性がある。そのため、本実施例では、前記付勢ベルト12の上方に、各突起部12aに接触するよう、インク滴を吸収しやすい材料(例えば、スポンジ状

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の樹脂や、布、紙等)からなるクリーナ13が備えられている。

【0023】さらに、本実施例のインク定着機構の場合、前記付勢ベルト12とクリーナ13が設けられており、さらに、該定着カバー14の上方には、支軸15bを軸にして回転可能なダフトカバー15が設けられ、該ダフトカバー15と前記定着カバー20との間の空間をダフト部15aとしている。前記定着カバー14は、10 透明なプラスチックあるいはパンチングメタル、ステンレス製金網等で形成したものを用い、外部から搬送中の記録紙1の状態が観察できる構成としている。さらに、定着カバー14には、その上面に、付勢ベルト12およびクリーナ13が存在する部分と前記ダフト部15aとを連通させる複数のルーバー14aが形成されており、記録紙1上のインク滴が蒸発定着する際に発生する水蒸気は前記複数のルーバー14aを通ってダフト部15a中へ放出されることになる。また、前記ダフトカバー15は、各種スポンジ状のプラスチック、各種焼結により成形した多孔質プラスチック、例えばPVA(ポリビニルアルコール)PVF(ポリビニルホルマール)、PE(ポリエチレン)や、パルプに塩化カルシウムを含浸させたシート等、吸湿性の部材で形成したものである。

【0024】このように、定着カバー14およびダフトカバー15を設けることで、ユーザーは、面状発熱部20やベルト5等に容易に触り得ない構造となる。さらに、前記面状発熱部20は、昇温時間の短縮のため、面状発熱部20を予め所定の温度に昇温させておくので、その際、面状発熱部20とその周囲とで温度差が生じるが、前記定着カバー14が設けられていることにより熱の放出が妨げられて前記温度差が小さくなり、熱エネルギーの損失が抑えられることになる。また、前記ダフト部15aにはファン16が設置され、該ダフト部15a内の空気および水蒸気を外部に排出する構成となっている。

【0025】さらに、本実施例において、ダフトカバー15は支軸15bを支点に回動自在に支持されており本装置中で記録紙1がジャム等を起こした場合本装置の操作者が本装置中の記録紙1のジャムを解除するため、図40 3に示すがごとくダフトカバー15を開放し、また、駆動ローラー9に連結されたハンドル21を回転させることによってジャム解除を行うことができる。

【0026】上述のような構成のインク定着装置を記録紙1が通過することにより、インクジェット記録ヘッド3から吐出されたインク滴1aは前記記録紙1に乾燥定着し、その後、排紙ローラー17、18間を経て排紙トレー19内に蓄積される。

【0027】本発明は、特にインクジェット記録方法の中でもインクを吐出するために利用されるエネルギーとして熱エネルギーを発生する手段(例えば電気熱交換体

やレーザ光等)を備え、前記熱エネルギーによりインクの状態変化を生起させる方式の記録ヘッド、インクジェット記録装置において、優れた効果をもたらすものである。

【0028】その代表的な構成や原理については、例えば、米国特許第4723129号明細書、同第4740796号明細書に開示されている基本的な原理を用いて行うものが好ましい。この方式は所謂オンデマンド型、コンティニュアス型のいずれにも適用可能であるが、特に、オンデマンド型の場合には、液体(インク)が保持されているシートや液路に対応して配置されている電気熱変換体に、記録情報に対応していて核沸騰を越える急速な温度上昇を与える少なくとも一つの駆動信号を印加することによって、電気熱変換体に熱エネルギーを発生せしめ、記録ヘッドの熱作用面に膜沸騰させて、効果的にこの駆動信号に一対一対応し液体(インク)内の気泡を形成できるので有効である。この気泡の成長、収縮により吐出用開口を介して液体(インク)を吐出させて、少なくとも一つの滴を形成する。この駆動信号をパルス形状とすると、即時適切に気泡の成長収縮が行われるので、特に応答性に優れた液体(インク)の吐出が達成でき、より好ましい。このパルス形状の駆動信号としては、米国特許第4463359号明細書、同第4345262号明細書に記載されているようなものが適している。尚、上記熱作用面の温度上昇率に関する発明の米国特許第4313124号明細書に記載されている条件を採用すると、さらに優れた記録を行うことができる。

【0029】記録ヘッドの構成としては、上述の各明細書に開示されているような吐出口、液路、電気熱変換体の組合せ構成(直線状液流路又は直角液流路)の他に熱作用部が屈曲する領域に配置されている構成を開示する米国特許第4558333号明細書、米国特許第445600号明細書を用いた構成も本発明に有効である。加えて、複数の電気熱変換体に対して、共通のスリットを電気熱変換体の吐出部とする構成を開示する特開昭59年第123670号公報や熱エネルギーの圧力波を吸収する開孔を吐出部に対応させる構成を開示する特開昭59年第138461号公報に基づいた構成としても本発明は有効である。

【0030】更に、インクジェット記録装置が記録できる最大記録媒体の幅に対応した長さを有するフルラインタイプの記録ヘッドとしては、上述した明細書に開示されているような複数記録ヘッドの組合せによって、その長さを満たす構成や一体的に形成された一個の記録ヘッドとしての構成のいずれでも良いが、本発明は、上述した効果を一層有効に發揮することができる。

【0031】加えて、装置本体に装着されることで、装置本体との電気的な接続や装置本体からのインクの供給が可能になる交換自在なチップタイプの記録ヘッド、あるいは、記録ヘッド自体に一体的に設けられたカートリ

ッジタイプの記録ヘッドを用いた場合にも本発明は有効である。

【0032】又、本発明のインクジェット記録装置の構成として設けられる、記録ヘッドに対しての回復手段、予備的な補助手段等を付加すること本発明の効果を一層安定できるので好ましいものである。これらを具体的に挙げれば、記録ヘッドに対しての、キャンピング手段、クリーニング手段、加圧あるいは吸引手段、電気熱変換対あるいはこれとは別の加熱素子あるいはこれらの組合せによる予備加熱手段、記録とは別の吐出を行う予備吐出モードを行うことも安定した記録を行うために有効である。

【0033】更に、インクジェット記録装置の記録モードとしては黒色等の主流色のみの記録モードだけではなく、記録ヘッドを一体的に構成するか複数個の組合せによってでもよいが、異なる色のカラー又は、混色によるフルカラーの少なくとも一つを備えた装置にも本発明は極めて有効である。

【0034】以上説明した本発明各実施例においては、インクを液体として説明しているが、室温やそれ以下で固化するインクであって、室温で軟化もしくは液体あるいは、上述のインクジェットではインク自体を30°C以上70°C以下の範囲内で温度調整を行ってインクの粘性を安定吐出範囲にあるように温度制御するのが一般的であるから、使用記録信号付与時にインクが液状をなすものであれば良い。加えて、積極的に熱エネルギーによる昇温をインクの固形状態から液体状態への態変化のエネルギーとして使用せしめることで防止するか又は、インクの蒸発防止を目的として放置状態で固化するインクを用いるかして、いずれにしても熱エネルギーの記録信号に応じた付与によってインクを液化してインク液状として吐出するものや記録媒体に到達する時点ではすでに固化し始めるもの等のような、熱エネルギーによって初めて液化する性質のインク使用も本発明には適用可能である。このような場合インクは、特開昭54-56847号公報あるいは特開昭60-71260号公報に記載されるような、多孔質シート凹部又は貫通孔に液状又は固体物として保持された状態で、電気熱変換体に対して対向するような形態としても良い。本発明においては、上述した各インクに対して最も有効なものは、上述した膜沸騰方式を実行するものである。

【0035】

【発明の効果】本発明は、以上説明したように構成されているので、下記のような効果を奏する。

(1) 画像形成された直後の被記録部材を、その最大記録幅の略全幅にわたって、加熱された搬送ベルトに圧接させて、少なくとも被記録部材の画像が形成された部分は必ず前記搬送ベルトに接触することになり、該搬送ベルトの熱が前記画像が形成された部分に均一に伝達され、画像品位を劣化させることなく短時間でインクを

乾燥定着させることができる。

(2) 請求項2に記載のもののように、吸水性を有するクリーナを設けることにより、付勢ベルトの突起部にインクが付着した場合でも該インクは前記クリーナによつて吸収されるので、前記突起部が再び被記録部材に接触する際、該被記録部材を汚したり画像を破壊したりすることがなくなる。

(3) 請求項4に記載のもののように、発熱手段を面状発熱部として、被記録部材が圧接される搬送ベルトに面接触させることにより、前記搬送ベルトを集中的に加熱することができ、インクの乾燥定着をより効率的に行うことが可能となる。

(4) 請求項5に記載のもののように、付勢ベルトの突起部を耐熱性を有する樹脂で形成することにより、被記録部材を介して熱が伝達される付勢ベルトの寿命が長くなり、経済的にも有利である。

【図面の簡単な説明】

【図1】本発明のインクジェット記録装置の一実施例を示す側面図である。

【図2】面状発熱部の構成の一例を示す断面図である。

【図3】図1に示したインクジェット記録装置のインク定着機構のダフトカバーを開いた状態を示す側面図である。

【符号の説明】

1 記録紙

1a インク滴

2 プラテンローラー

3 インクジェット記録ヘッド

3a 吐出部

4 下フレーム

4a ガイド部

5 ベルト

6 従動ローラー

7 支持部材

8 圧縮ばね

9 駆動ローラー

10 付勢ベルト従動ローラー

11 付勢ベルト駆動ローラー

12 付勢ベルト

12a 突起部

13 クリーナ

14 定着カバー

14a ルーバー

15 ダフトカバー

15a ダフト部

15b 支軸

16 ファン

17、18 排紙ローラー

19 排紙トレー

20 面状発熱部

21 ハンドル

201 絶縁材

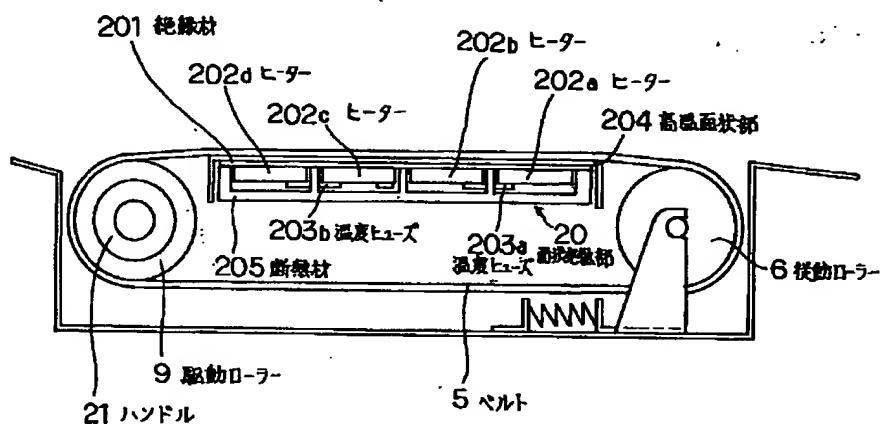
202a、202b、202c、202d ヒーター

203a、203b 温度ヒューズ

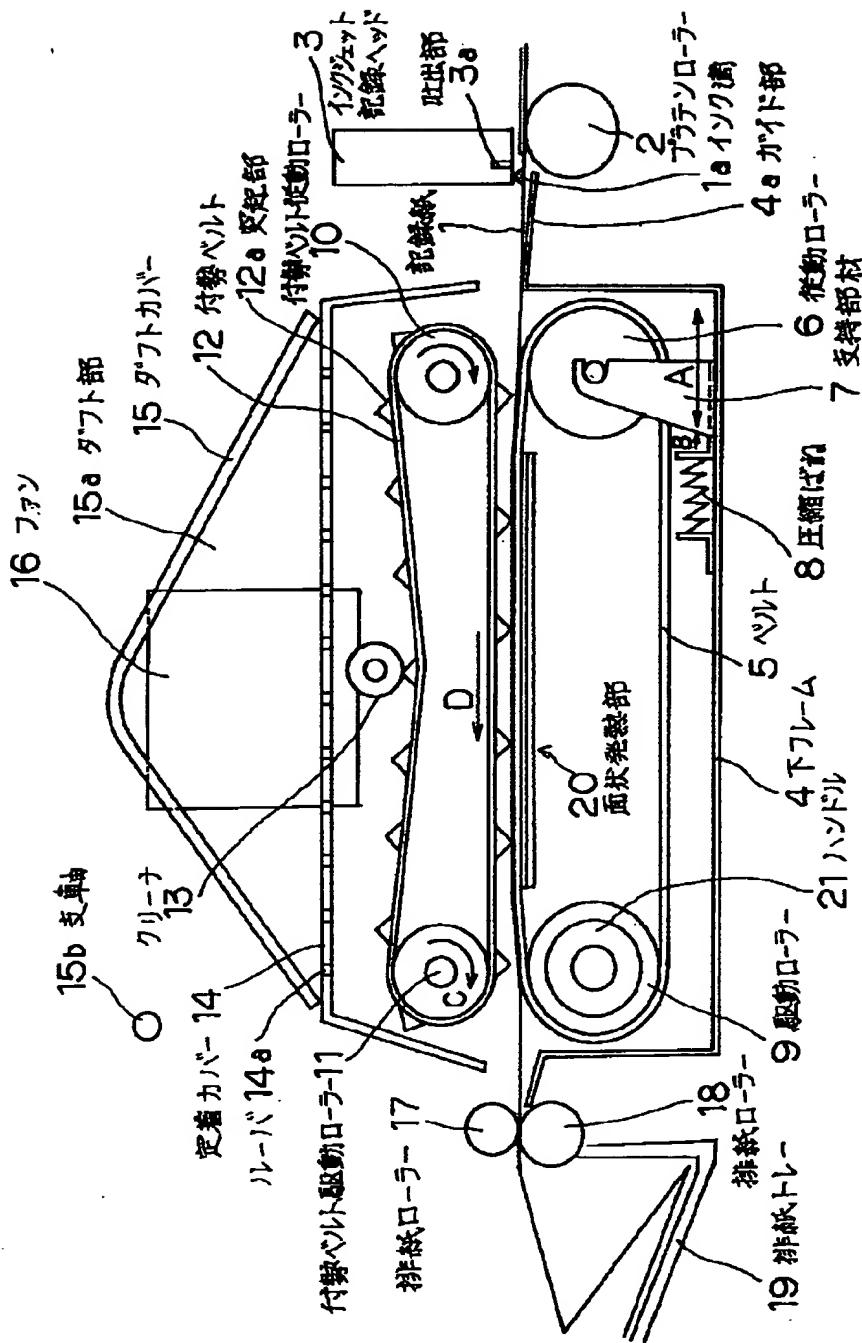
204 高温面状部

205 断熱材

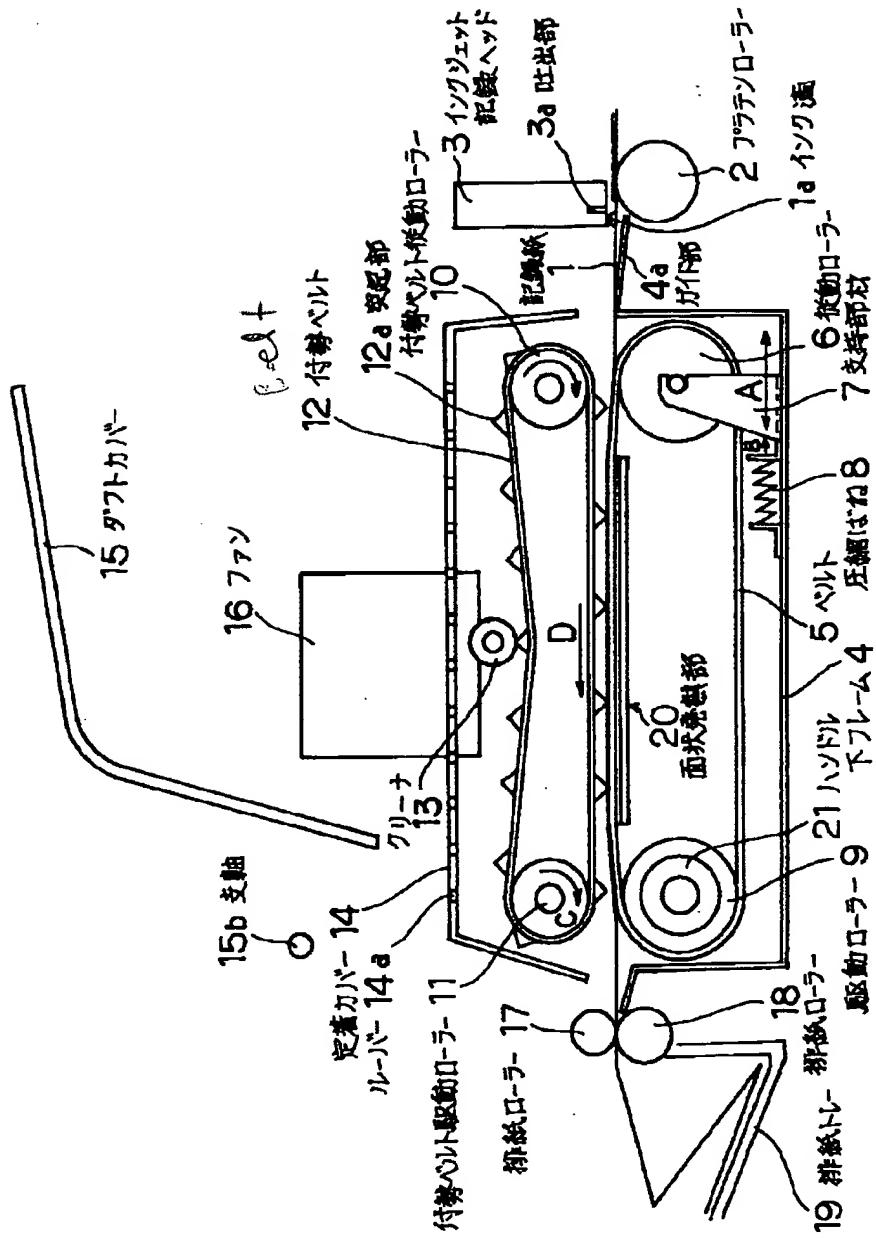
【図2】



【図1】



【図3】



## フロントページの続き

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